

APPENDIX H

NOISE ANALYSIS

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***EAST SUNNYVALE ITR PROJECT
ENVIRONMENTAL NOISE ASSESSMENT
SUNNYVALE, CALIFORNIA***

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Introduction

This report presents the results of the noise assessment conducted for the East Sunnyvale ITR project proposed in Sunnyvale, California. The project is a General Plan Amendment to change the land use designation of the site to Industrial to Residential (ITR) which would allow industrial, office, commercial, and residential land uses to exist in the same zoning district while the area gradually transitions. This assessment evaluates the project on a program level and provides project level analysis of two parcels; the AMD Property (The Riding Group) and the Taylor Woodrow Property. The setting section presents the fundamentals of environmental noise, provides a discussion of policies and standards applicable to the project, and presents the results of noise measurements made at the site. The impacts and mitigation measures section provides a discussion of potential project impacts on a program level for the entire site and project level for the AMD Property and the Taylor Woodrow Property. Mitigation measures are then presented to reduce significant noise impacts a less-than-significant level.

Fundamentals of Environmental Noise

Noise is defined as unwanted sound. Airborne sound is a rapid fluctuation of air pressure above and below atmospheric pressure. Sound levels are usually measured and expressed in decibels (dB) with 0 dB corresponding roughly to the threshold of hearing. Decibels and other technical terms are defined in Table 1.

Most of the sounds which we hear in the environment do not consist of a single frequency, but rather a broad band of frequencies, with each frequency differing in sound level. The intensities of each frequency add together to generate a sound. The method commonly used to quantify environmental sounds consists of evaluating all of the frequencies of a sound in accordance with a weighting that reflects the facts that human hearing is less sensitive at low frequencies and extreme high frequencies than in the frequency mid-range. This is called "A" weighting, and the decibel level so measured is called the A-weighted sound level (dBA). In practice, the level of a sound source is conveniently measured using a sound level meter that includes an electrical filter corresponding to the A-weighting curve. Typical A-weighted levels measured in the environment and in industry are shown in Table 2 for different types of noise.

Although the A-weighted noise level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from distant sources which create a relatively steady background noise in which no particular source is identifiable. To describe the time-varying character of environmental noise, the statistical noise descriptors, L_{01} , L_{10} , L_{50} , and L_{90} , are commonly used. They are the A-weighted noise levels equaled or exceeded during 1%, 10%, 50%, and 90% of a stated time period. A single number descriptor called the L_{eq} is also widely used. The L_{eq} is the average A-weighted noise level during a stated period of time.

In determining the daily level of environmental noise, it is important to account for the difference in response of people to daytime and nighttime noises. During the nighttime, exterior

Table 1 Definitions of Acoustical Terms Used in this Report

Term	Definitions
Decibel, dB	A unit describing, the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for air is 20.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e.g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Equivalent Noise Level, Leq	The average A-weighted noise level during the measurement period.
L_{\max} , L_{\min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{01} , L_{10} , L_{50} , L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels measured in the night between 10:00 pm and 7:00 am.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Table 2 Typical Noise Levels in the Environment

Common Outdoor Noise Source	Noise Level (dBA)	Common Indoor Noise Source
120 dBA		
Jet fly-over at 300 meters		Rock concert
110 dBA		
100 dBA		
Pile driver at 20 meters		Night club with live music
90 dBA		
Large truck pass by at 15 meters		
80 dBA		
Freeway at 30 meters		Noisy restaurant
Gas lawn mower at 30 meters		Garbage disposal at 1 meter
Commercial/Urban area daytime	70 dBA	Vacuum cleaner at 3 meters
Suburban expressway at 90 meters		Normal speech at 1 meter
Suburban daytime	60 dBA	
	50 dBA	Active office environment
Urban area nighttime		Quiet office environment
	40 dBA	
Suburban nighttime		
Quiet rural areas	30 dBA	Library
Wilderness area	20 dBA	Quiet bedroom at night
Most quiet remote areas	10 dBA	Quiet recording studio
Threshold of human hearing	0 dBA	Threshold of human hearing

background noises are generally lower than the daytime levels. However, most household noise also decreases at night and exterior noise becomes very noticeable. Further, most people sleep at night and are very sensitive to noise intrusion. To account for human sensitivity to nighttime noise levels, a descriptor, L_{dn} (day/night average sound level), was developed. The L_{dn} divides the 24-hour day into the daytime of 7:00 AM to 10:00 PM and the nighttime of 10:00 PM to 7:00 AM. The nighttime noise level is weighted 10 dB higher than the daytime noise level. The Community Noise Equivalent Level (CNEL) is another 24-hour average which includes both an evening and nighttime weighting.

REGULATORY BACKGROUND

The State of California and the City of Sunnyvale establish guidelines, regulations, and policies designed to limit noise exposure at noise sensitive land uses. Appendix G of the State CEQA Guidelines, the State Building Code, the City of Sunnyvale Noise Sub-Element of the General Plan, and the City of Sunnyvale Municipal Code present the following:

State CEQA Guidelines. The California Environmental Quality Act (CEQA) includes qualitative guidelines for determining significance of adverse environmental noise impacts. A project will typically have a significant impact if it would;

- a. Expose people to or generate noise levels in excess of standards established in the local general plan, noise ordinance, or applicable standards of other agencies.
- b. Expose people to or generate excessive groundborne vibration or groundborne noise levels.
- c. Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- d. Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
- e. For projects within an area covered by an airport land use plan or within two miles of a public airport or public use airport when such an airport land use plan has not been adopted, or within the vicinity of a private airstrip, expose people residing or working in the project area to excessive aircraft noise levels.
- f. For a project within the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels.

CEQA does not define what noise level increase would be considered substantial. Typically, project-generated noise level increases of 3 dBA L_{dn} or greater would be considered significant where exterior noise levels would exceed the normally acceptable noise level standard (60 dBA L_{dn}). Where noise levels would remain at or below the normally acceptable noise level standard with the project, noise level increases of 5 dBA L_{dn} or greater would be considered significant.

Checklist items (a), (c), (d), and (e) are relevant to the proposed project. The project is not located near any rail lines so ground-borne noise and vibration are not concerns at the project site. The project is not located in the vicinity of a private airstrip. Checklist items (b) and (f) are not carried forward for further analysis.

Section 1208 of the 2001 California Building Code. New multi-family housing in the State of California is subject to the environmental noise limits set forth in Appendix Chapter 1208A.8.4 of the California Building Code. The noise limit is a maximum interior noise level of 45 dBA L_{dn} . Where exterior noise levels exceed 60 dBA L_{dn} , a report must be submitted with the building plans describing the noise control measures that have been incorporated into the design of the project to meet the interior noise limit.

City of Sunnyvale Noise Sub-Element of the General Plan. The Noise Sub-Element establishes goals, policies, and standards for evaluating the compatibility of proposed land uses with the onsite noise environment. The Sub-Element states that the exterior noise levels up to 60 dBA L_{dn} as normally acceptable, up to 70 dBA L_{dn} as conditionally acceptable, up to 75 dBA L_{dn} as normally unacceptable, and noise levels above 75 dBA L_{dn} as clearly unacceptable. Goals and policies of the Sub-element relevant to this analysis are presented below:

GOAL 3.6A - MAINTAIN OR ACHIEVE A COMPATIBLE NOISE ENVIRONMENT FOR ALL LAND USES IN THE COMMUNITY.

Policy 3.6A.1: Prevent significant noise impacts from new development by applying state noise guidelines and Sunnyvale Municipal Code noise regulations in the evaluation of land use issues and proposals.

Policy 3.6A.2: Enforce and supplement state laws regarding interior noise levels of residential units.

Policy 3.6A.3: Consider techniques that block the path of noise and insulate people from noise.

GOAL 3.6B - PRESERVE AND ENHANCE THE QUALITY OF NEIGHBORHOODS BY MAINTAINING OR REDUCING THE LEVELS OF NOISE GENERATED BY TRANSPORTATION FACILITIES.

Policy 3.6B.1: Refrain from increasing or reduce the noise impacts of major roadways.

GOAL 3.6C – MAINTAIN OR ACHIEVE ACCEPTABLE LIMITS FOR THE LEVELS OF NOISE GENERATED BY LAND USE OPERATIONS AND SINGLE-EVENTS.

Policy 3.6C.1: Regulate land use operation noise.

Policy 3.6C.2: Regulate select single-event noises and periodically monitor the effectiveness of the regulations.

City of Sunnyvale Municipal Code. Title 19, Chapter 19.42 presents operational noise standards that would be enforced on residentially zoned property.

- Operational noise shall not exceed seventy-five dBA at any point on the property line of the premises upon which the noise or sound is generated or produced; provided, however, that the noise or sound level shall not exceed fifty dBA during nighttime or sixty dBA during daytime hours at any point on adjacent residentially zoned property. If the noise occurs during nighttime hours and the enforcing officer has determined that the noise involves a steady, audible tone such as a whine, screech or hum, or is a staccato or.

intermittent noise (e.g., hammering) or includes music or speech, the allowable noise or sound level shall not exceed forty-five dBA.

- Powered equipment used on a temporary, occasional or infrequent basis which produces a noise greater than the applicable operational noise limit set forth in subsection (a) shall be used only during daytime hours when used adjacent to a property with a residential zoning district. Powered equipment used on other than a temporary, occasional or infrequent basis shall comply with the operational noise requirements. For the purpose of this section, powered equipment does not include leaf blowers. Construction activity regulated by Title 16 of this code shall not be governed by this section.
- It is unlawful for any person to make or allow to be made a nighttime delivery to a commercial or industrial establishment when the loading/unloading area of the establishment is adjacent to a property in a residential zoning district. Businesses legally operating at a specific location as of February 1, 1995, are exempt from this requirement.
- A “leaf blower” is a small, combustion engine-powered device used for property or landscape maintenance that can be hand-held or carried on the operator’s back and which operates by propelling air under pressure through a cylindrical tube. It is unlawful for any person to operate a leaf blower on private property in or adjacent to a residential area except between the hours of 8:00 a.m. and 8:00 p.m. Effective January 1, 2000, all leaf blowers operated in or adjacent to a residential area shall operate at or below a noise level of sixty-five dBA at a distance of fifty feet, as determined by a test conducted by the American National Standards Institute or an equivalent. The dBA rating shall be prominently displayed on the leaf blower. (Ord. 2623-99 § 1 (part); prior zoning code § 19.24.020(b)--(d)).

Title 16, Chapter 16.08 presents construction noise regulations.

- Construction activity shall be permitted between the hours of seven a.m. and six p.m. daily Mondays through Fridays. Saturday hours of operation shall be between eight a.m. and five p.m. There shall be no construction activity on Sundays or national holidays when city offices are closed.
- No loud environmentally disruptive noises, such as air compressors without mufflers, continuously running motors or generators, loud playing musical instruments, radios, etc. will be allowed where such noises may be a nuisance to adjacent residential neighborhoods. Exceptions: (a) Construction activity is permitted for detached single-family residential properties when the work is being performed by the owner of the property, provided no construction activity is conducted prior to seven a.m. or after seven p.m. Mondays through Fridays, prior to eight a.m. or after seven p.m. on Saturdays and prior to nine a.m. or after six p.m. on Sundays and national holidays when city offices are closed. It is permissible for up to two persons to assist the owner of the property so long as they are not hired by the owner to perform the work. For purposes of this section, “detached single-family residential property” refers only to housing that stands completely alone with no adjoining roof, foundation or sides. (b) Where emergency conditions exist, construction activity may be permitted at any hour or day of the week. Such emergencies shall be completed as rapidly as possible to prevent any disruption to the residential neighborhoods. (Ord. 2774-05 § 1; Ord. 2756-04 § 1; Ord. 2704-02 § 2).

Existing Noise Environment

The project site is located in Sunnyvale, California. It is bounded by Lawrence Expressway to the east, North Wolfe Road to the west, Stewart Drive to the south, and Duane Avenue to the north. Land uses bordering the site include residential uses to the north, industrial uses to the south, residential and commercial uses to the east, and by the Rainbow Montessori Child Development School to the west. Mineta San Jose International Airport is about 3 miles east of the site, which places the project site well outside the airport's 65 CNEL noise contour. The site is also outside of the 65 CNEL contour of Moffet Field. While occasional aircraft overflights are audible, vehicle traffic noise is the primary source of noise in the vicinity of the project. A survey of existing industrial uses on the project site did not reveal any significant stationary noise sources.

A noise monitoring survey was performed on January 19-20, 2006 to quantify the existing noise environment on the project site. Four long-term noise measurements (24-hour durations) and five short-term noise measurements (10-minute durations) were conducted at representative locations to complete the noise monitoring survey. Noise measurement locations are shown on Figure 1.

Long-term noise measurement LT-1 was made approximately 70 feet from the centerline of North Wolfe Road. The primary noise source at this location is vehicle traffic along North Wolfe Road, with some construction noise in the background. Daytime hourly average noise levels ranged from 65 to 70 dBA L_{eq} and nighttime hourly average noise levels ranged from 52 to 65 dBA. The day-night average noise level for the measurement was 67 dBA L_{dn} . Noise data collected at LT-1 is shown in Figure 2. Measurement location LT-2 was approximately 33 feet from the centerline of Stewart Drive. The major noise source at this location was local vehicle traffic on Stewart Drive. Daytime hourly average noise levels ranged from 60 to 67 dBA L_{eq} and nighttime hourly average noise levels ranged from 52 to 65 dBA. The day-night average noise level for the measurement was 67 dBA L_{dn} . Noise data collected at LT-2 is shown in Figure 3. Measurement location LT-3 was approximately 51 feet from the centerline of East Duane Avenue. The primary noise source at this location was local vehicle traffic on East Duane Avenue. Daytime hourly average noise levels ranged from 64 to 70 dBA L_{eq} and nighttime hourly average noise levels ranged from 54 to 64 dBA. The day-night average noise level for the measurement was 69 dBA L_{dn} . Noise data collected at LT-3 is shown in Figure 4. Measurement location LT-4 was approximately 132 feet from the centerline of the Lawrence Expressway. The primary noise source at this location was local vehicle traffic on Lawrence Expressway. Daytime hourly average noise levels ranged from 68 to 71 dBA L_{eq} and nighttime hourly average noise levels ranged from 62 to 70 dBA. The day-night average noise level for the measurement was 73 dBA L_{dn} . Noise data collected at LT-4 is shown in Figure 5.

Five short-term measurements were taken in the vicinity of the site. The L_{dn} noise level was estimated at the short-term locations by comparing the L_{eq} noise level to the concurrent L_{eq} at a nearby long-term measurement site. Locations for the measurements are shown in Figure 1. Short-term measurement one (ST-1) was made at LT-1 location, about 5 feet off the surrounding ground. The primary noise source during the measurement was vehicle traffic along Wolfe Road. The ten-minute average noise level for the measurement was 65 dBA L_{eq} . The estimated day-night average noise level for the measurement is 66 dBA L_{dn} . Short-term measurement two (ST-2) was about 36 feet from the centerline of Deguigne Drive. The primary noise source during the measurement was vehicle traffic along the roadway. The ten-minute average noise level for the measurement was 64 dBA L_{eq} . The estimated day-night average noise level for the measurement is 66 dBA L_{dn} . Short-term measurement three (ST-3) was about 45 feet from the centerline of Stewart Drive. The primary noise source during the measurement was vehicle traffic along Stewart Drive. The maximum noise level for the measurement was generated by a motorcycle passby and was about 69 dBA. The ten-minute average noise level for the measurement was 60 dBA L_{eq} . The

estimated day-night average noise level for the measurement is 61 dBA L_{dn} . Short-term measurement four (ST-4) was made at LT-4 location, about 5 feet off the surrounding ground. The primary noise source during the measurement was vehicle traffic along Lawrence Expressway. The ten-minute average noise level for the measurement was 68 dBA L_{eq} . The estimated day-night average noise level for the measurement is 72 dBA L_{dn} . Short-term measurement five (ST-5) was about 60 feet from the centerline of East Duane Avenue. The primary noise source during the measurement was vehicle traffic along East Duane Avenue. The ten-minute average noise level for the measurement was 66 dBA L_{eq} . The estimated day-night average noise level for the measurement is 68 dBA L_{dn} . A chart of the short-term noise measurements is shown on Table 3.

Figure 2 – Daily Trend in Noise Levels at LT-1

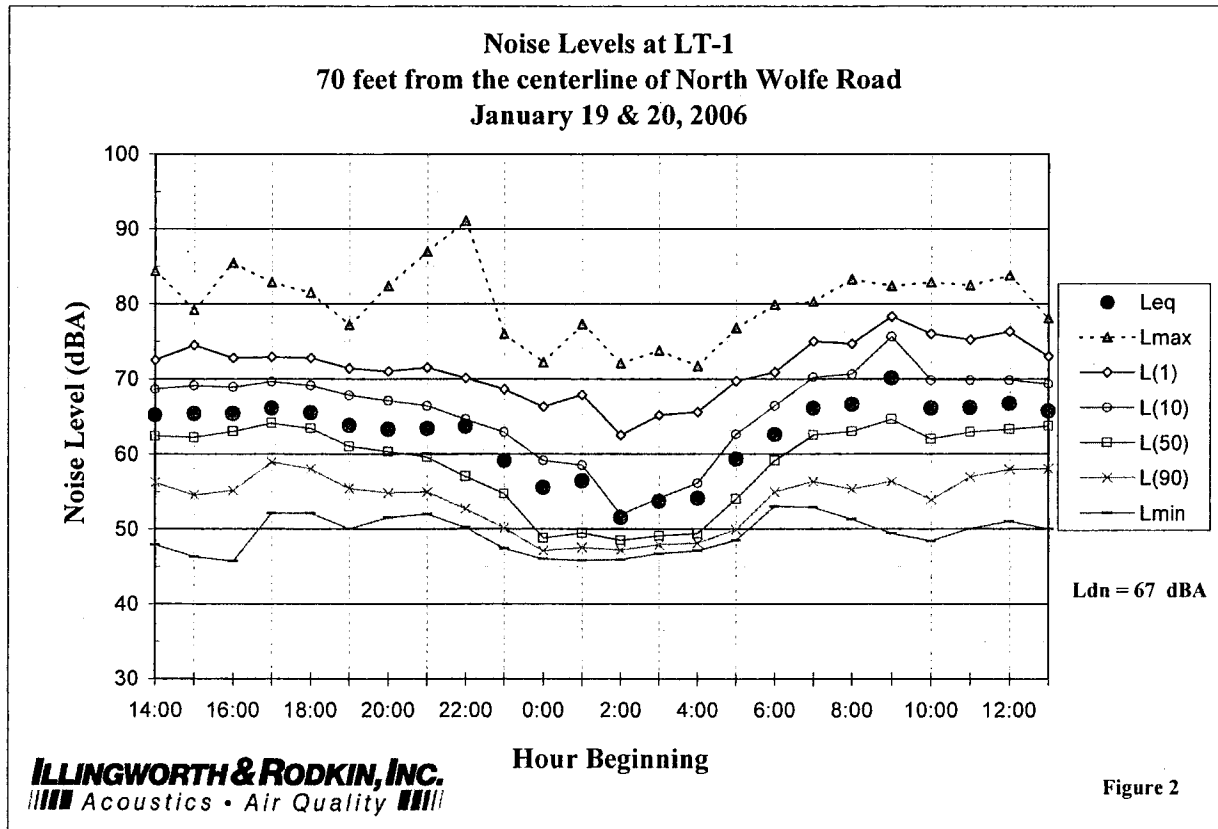


Figure 3 – Daily Trend in Noise Levels at LT-2

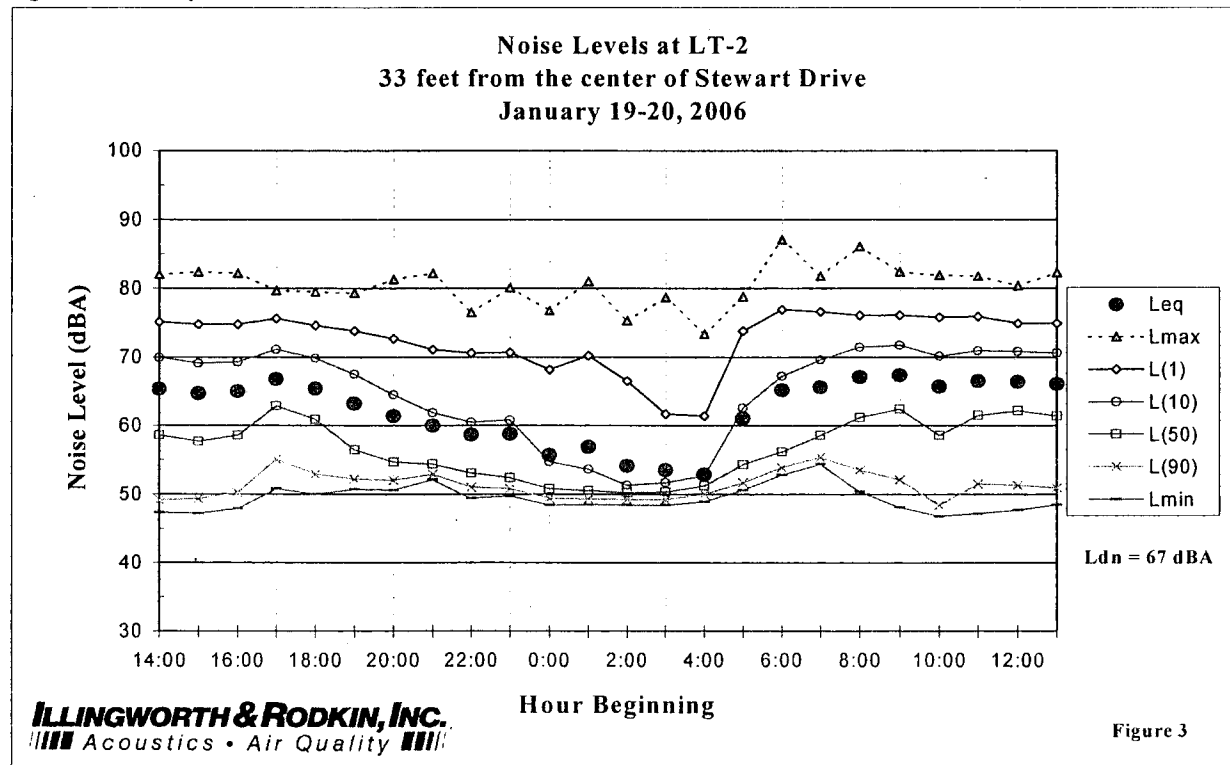


Figure 4 – Daily Trend in Noise Levels at LT-3

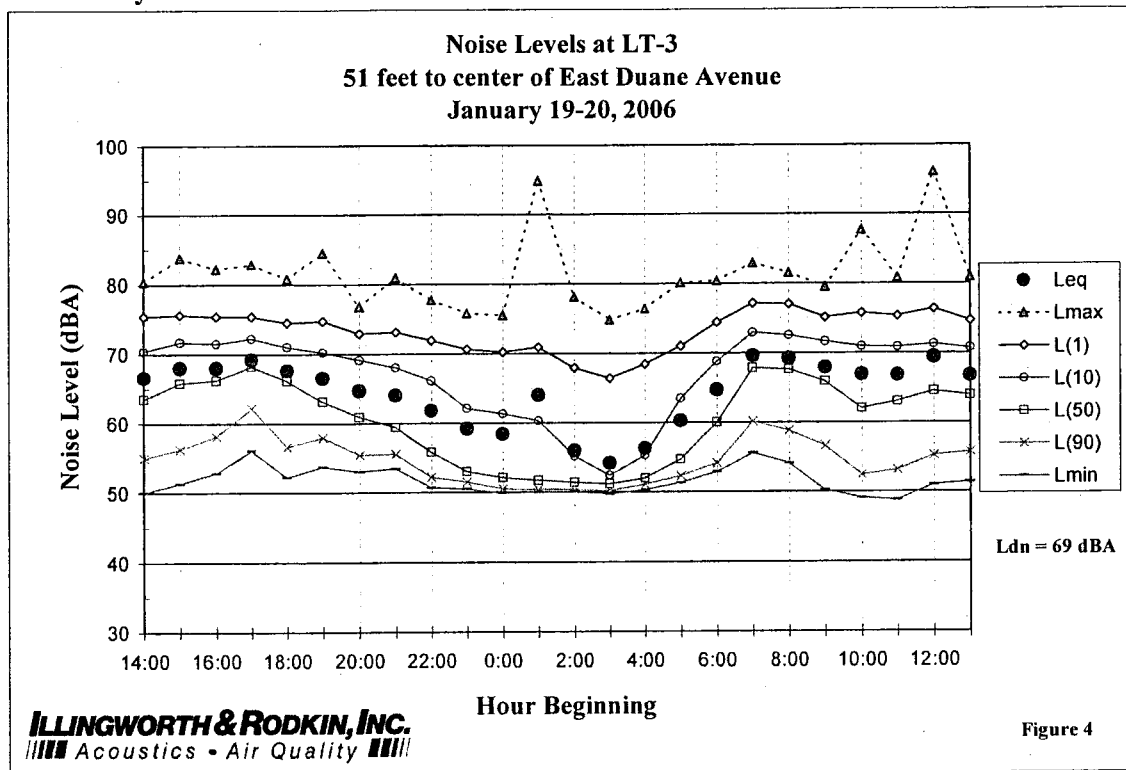


Figure 5 – Daily Trend in Noise Levels at LT-4

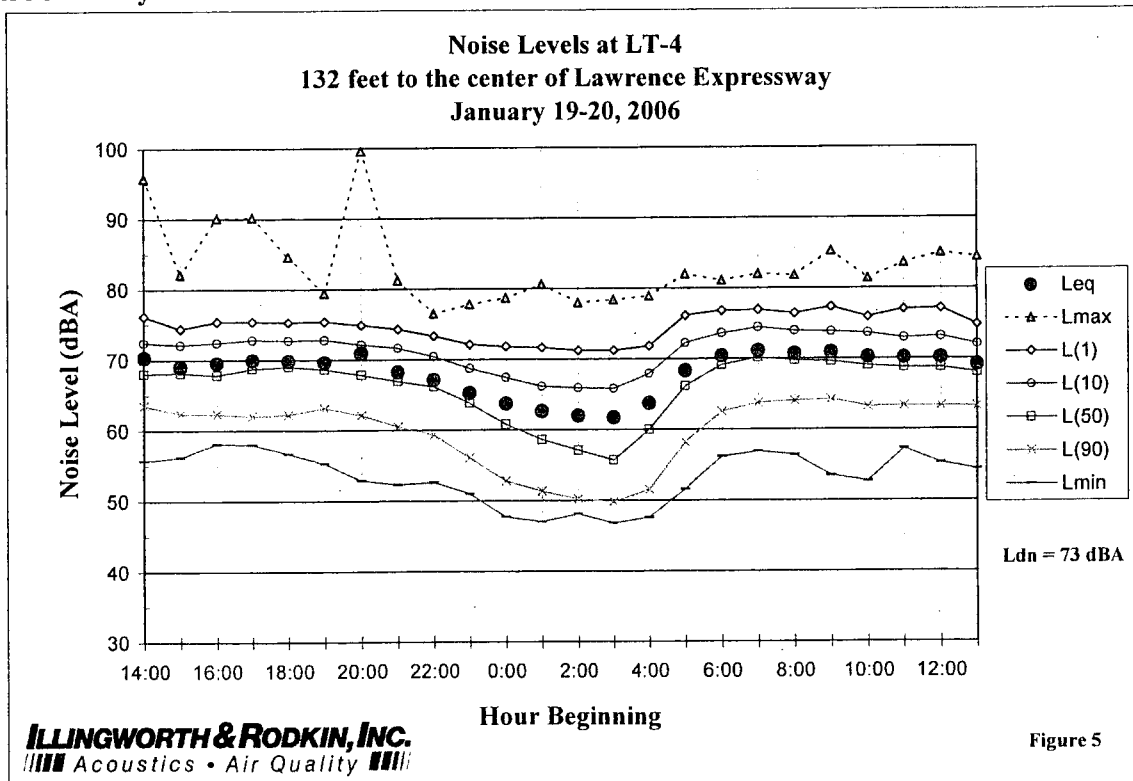


Table 3 – Short-term Noise Measurement Data

Measurement Description					Noise Level (dBA)							
#	Location	Date	Time	Duration (min)	Leq	Lmax	L(1)	L(10)	L(50)	L(90)	Lmin	Ldn*
ST-1	70 feet to N. Wolfe Rd.	01/20/06	12:40 PM	10	65	74	72	69	64	59	55	66
ST-2	36 feet to Deguigne Dr.	01/20/06	1:00 PM	10	64	77	73	67	60	53	51	66
ST-3	45 feet to Stewart Dr.	01/20/06	1:15 PM	10	60	69	67	64	57	50	48	61
ST-4	132 feet to Lawrence Expy.	01/20/06	1:30 PM	10	68	78	74	71	67	62	55	72
ST-5	60 feet to Duane Ave.	01/20/06	1:50 PM	10	66	74	73	69	64	58	54	68

*Ldn noise level is estimated based on noise levels at nearby long-term noise measurements.

Future Noise Environment

The future noise environment at the project site would continue to result primarily from transportation noise sources in the project vicinity. Traffic along local roadways would be the predominant noise source affecting the site. Based on a review of 2020 traffic volumes along project area roadways, traffic noise levels are anticipated to increase by about 2 to 3 dBA L_{dn} as a result of anticipated development. The project would locate residential land uses adjacent to intermittent sources of noise including parking lots of adjacent office buildings and playfields associated with the school located west of the site. High-density residential land uses would be compatible with these intermittent noise sources. Noise-generating activities (vehicle circulation, engine starts, door slams, etc.) at adjacent parking lots would generally coincide with increased activities in the parking lots of the proposed residential land uses. Periodically, office parking lots are cleaned with vacuum trucks and landscaping activities occur. The City of Sunnyvale limits the use of leaf blowers in the municipal code. Maintenance occurring that the parking lots of the adjacent industrial uses would be required to comply with the municipal code with the development of the project.

“It is unlawful for any person to operate a leaf blower on private property in or adjacent to a residential area except between the hours of 8:00 a.m. and 8:00 p.m. Effective January 1, 2000, all leaf blowers operated in or adjacent to a residential area shall operate at or below a noise level of sixty-five dBA at a distance of fifty feet, as determined by a test conducted by the American National Standards Institute or an equivalent. The dBA rating shall be prominently displayed on the leaf blower.”

Residential land uses would also be located adjacent to nearby playfields. Again, high density residential land uses would be considered compatible with intermittent noise generated at playfields. However, as residents become accustomed to the noise generated at these fields, and if the school desires to change the use of the fields or timing of events (e.g., lighting a football field for evening use), there may be concern expressed by the recently developed residential land uses whereas the current land uses would not likely express concern.

NOISE IMPACTS AND MITIGATION MEASURES

Significance Criteria

Appendix G of the CEQA Guidelines states that a project would normally be considered to have a significant impact if noise levels conflict with adopted environmental standards or plans, if noise levels generated by the project would substantially increase existing noise levels on a permanent or temporary basis, or if persons would be located within two miles of a public airport and exposed to excessive noise levels.

PROGRAM LEVEL ANALYSIS

Impact 1: Noise and Land Use Compatibility. Future residential uses developed within the ITR project area would be exposed to exterior traffic noise levels exceeding 60 dBA L_{dn} . Noise levels greater than 60 dBA L_{dn} are considered conditionally acceptable as specified in Sunnyvale's noise and land use compatibility guidelines in the General Plan. Interior noise levels would be expected to exceed 45 dBA L_{dn} without the incorporation of noise insulation features in the project design. **This is a *potentially significant* impact.**

Exterior Noise Levels

The perimeter of the project site would be exposed to traffic noise levels exceeding the City of Sunnyvale's "normally acceptable" noise level standard for residential land use (60 dBA L_{dn}). Noise exposures at portions of the project site adjacent to Lawrence Expressway, Duane Avenue, and North Wolfe Road would be 70 dBA L_{dn} or greater. Table 4 summarizes the results of noise contour distance calculations assuming no intervening shielding or excess attenuation with distance from the roadway. Residential land uses proposed within the 60 dBA L_{dn} contour distance could have exterior noise exposures of greater than the "normally acceptable" noise and land use compatibility standards thereby requiring further project-level analyses to design appropriate mitigation measures to reduce exterior and interior noise levels to acceptable levels.

Table 4 – Future (2020) Noise Contours for Area Roadways

Roadway	Distance from Roadway Center to Noise Contour (feet)		
	70 L_{dn}	65 L_{dn}	60 L_{dn}
Lawrence Expressway	280	610	1320
North Wolfe Road	70	150	320
Duane Avenue	60	130	270
Stewart Avenue	--	60	140

Interior Noise Levels

The project would allow the construction of multi-story residential units throughout the site. Exterior noise levels at the facades of the nearest residential units to Lawrence Expressway would be 75 dBA L_{dn} . Exterior noise levels at the perimeter of the project site near North Wolfe Road, Duane Avenue, and Stewart Avenue would range from about 68 to 71 dBA L_{dn} at a distance of 50 feet from the roadway center. Multi-family residential land uses proposed in noise environments greater than 60 dBA L_{dn} are subject to the requirements of Appendix Chapter 1208A.8.4 of the California Building Code. Where exterior noise levels exceed 60 dBA L_{dn} /CNEL, a report must be submitted with the building plans

describing the noise control measures that have been incorporated into the design of the project to meet the noise limit.

Standard residential construction with the windows partially open for ventilation provides approximately 15 dBA of exterior to interior noise reduction. Standard residential construction assuming the incorporation of a forced-air mechanical ventilation unit (allowing the occupant to control noise by maintaining the windows shut) provides 20 to 25 dBA of noise reduction in interior spaces. Where noise levels exceed 60 dBA L_{dn} , forced-air mechanical ventilation systems are normally required. Where exterior noise levels exceed 70 dBA L_{dn} , special sound rated construction systems are normally required. The exact specifications of window and wall systems cannot be accurately predicted at this time, but once building elevations and floor plans are developed, the specifications can be made. To control interior maximum noise levels to minimize the potential for activity interference and sleep disturbance, noise insulation features such as stucco-sided walls and sound-rated windows and doors would be required for residences located near Lawrence Expressway. The noise control treatments should be designed to reduce interior noise levels to 45 dBA L_{dn} or less.

Mitigation Measures:

The following mitigation measures shall be included in the project to reduce the impact to a less-than-significant level:

- When developing the project's site plan, locate noise-sensitive outdoor use areas away from adjacent noise sources. Shield noise-sensitive spaces with buildings or noise barriers whenever possible to reduce exterior noise levels. The final detailed design of the heights and limits of proposed noise barriers shall be completed at the time that the final site and grading plans are submitted.
- Project-specific acoustical analyses are mandated by the State for new multi-family uses where noise levels exceed 60 dBA L_{dn} . The analyses shall meet the following noise reduction requirements. Interior average noise levels shall be reduced to 45 dBA L_{dn} or lower to meet State and local standards. Building sound insulation requirements would need to include the provision of forced-air mechanical ventilation for all new units exposed to exterior noise levels greater than 60 dBA L_{dn} , so that windows could be kept closed at the occupant's discretion to control noise. Special building construction techniques (e.g., sound-rated windows and building facade treatments) would be required for new residential uses adjacent to perimeter roadways. These treatments include, but are not limited to, sound rated windows and doors, sound rated wall constructions, acoustical caulking, etc. The specific determination of what treatments are necessary will be conducted on a unit-by-unit basis. Results of the analysis, including the description of the necessary noise control treatments, will be submitted to the City along with the building plans and approved prior to issuance of a building permit. Feasible construction techniques such as these would adequately reduce interior noise levels to 45 dBA L_{dn} or lower.

With the implementation of the above measures, the impact would be less-than-significant.

Impact 2: Project Operations. Project generated traffic would not measurably change the existing noise environment at nearby noise sensitive uses. **This is a less-than-significant impact.**

The noise environment in the vicinity is primarily a result of noise produced by vehicular traffic on the streets serving the site. An increase in traffic volumes would therefore affect the noise levels at the

project site. *Hexagon Transportation Consultants, Inc.* completed a traffic analysis for the project. The traffic analysis included existing, background, and project traffic for three project scenarios. Existing traffic volumes were compared to background and project scenarios to assess the potential for an increase in traffic noise in the vicinity of the project area. Day-night average noise levels would increase by less than 1 dBA as result of the project. This increase would not be measurable or perceptible and would not exceed the criteria for determining a significant traffic noise impact.

Mitigation Measures: None Required

Impact 3: Construction Noise. Noise levels generated by construction activities on the site would not be expected to adversely affect adjacent noise-sensitive land uses provided standard construction noise restrictions are implemented at the site and the duration of project construction affecting a particular receiver or group of receivers is limited to one construction season or less. **This is a *less-than-significant* impact.**

Future construction on the site would generate noise, and would temporarily increase noise levels at adjacent land uses. Noise impacts resulting from construction depend on the noise generated by various pieces of construction equipment, the timing and duration of noise generating activities, and the distance between construction noise sources and noise sensitive receptors. Construction noise impacts primarily occur when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction durations last over extended periods of time. Where noise from construction activities exceeds 60 dBA L_{eq} and exceeds the ambient noise environment by at least 5 dBA at noise-sensitive uses in the project vicinity, the impact would be considered significant.

Construction activities generate considerable amounts of noise. Construction-related noise levels are normally highest during the demolition phase and during the construction of project infrastructure. These phases of construction require heavy equipment that normally generates the highest noise levels over extended periods of time. Typical hourly average construction generated noise levels are about 81 dBA to 88 dBA measured at a distance of 50 feet from the center of the site during busy construction periods (e.g., earth moving equipment, impact tools, etc.). Construction-related noise levels are normally less during building erection, finishing, and landscaping phases. There would be variations in construction noise levels on a day-to-day basis depending on the actual activities occurring at the site. Construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding by buildings would provide an additional 5 to 10 decibels of attenuation at distant receptors.

Residential projects do not normally generate significant noise impacts when standard construction noise control measures are enforced at the project site and when the duration of the noise generating construction period is limited to one construction season (typically one year) or less. Construction noises associated with projects of this type are disturbances that are necessary for the construction or repair of buildings and structures in urban areas. Reasonable regulation of the hours of construction, as well as regulation of the arrival and operation of heavy equipment and the delivery of construction materials, are necessary to protect the health and safety of persons, promote the general welfare of the community, and maintain the quality of life. Limiting the hours when construction can occur to daytime hours is often a simple method to reduce the potential for noise impacts. In areas immediately adjacent to construction, controls such as constructing temporary noise barriers and utilizing “quiet” construction equipment can also reduce the potential for noise impacts.

The following standard controls are assumed to be included in the project:

- Construction activities shall be limited to the hours between 7:00 a.m. and 6:00 p.m., Monday through Friday, and between the hours of 8:00 a.m. and 5:00 p.m. on Saturdays. No construction activities should occur on Sundays or federal holidays (Consistent with Municipal Code).
- Equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- Locate stationary noise generating equipment as far as possible from adjacent residential receivers.
- Acoustically shield stationary equipment located near existing residential receivers.
- Utilize "quiet" air compressors and other stationery noise sources where technology exists.
- The contractor shall prepare a detailed construction plan identifying the schedule for major noise-generating construction activities. The construction plan shall identify a procedure for coordination with adjacent residential land uses so that construction activities can be scheduled to minimize noise disturbance.
- Designate a "disturbance coordinator" who would be responsible for responding to any complaints about construction noise. The disturbance coordinator will determine the cause of the noise complaint (e.g., bad muffler, etc.) and will require that reasonable measures be implemented to correct the problem.

With the incorporation of these standards measures, the noise impact resulting from project construction would be considered less-than-significant.

Mitigation Measures: No additional measures are required.

Impact 4: Noise and Land Use Compatibility (Aircraft). Residential uses developed at the site would be located in a compatible noise environment in the vicinity of the Mineta San Jose International Airport and Moffett Field. **This is a *less-than-significant impact*.**

A review of the 65 CNEL noise contour map established by the Santa Clara County ALUC indicates that the project site is located outside of the future 65 CNEL noise contours of Mineta San Jose International Airport and Moffett Field. Where noise levels are less than 65 CNEL, residential land uses are considered compatible. This is a less-than-significant impact.

Mitigation Measures: No additional measures are required.

PROJECT LEVEL ANALYSIS – AMD PROPERTY

Impact 5: Noise and Land Use Compatibility. The project proposes residential land uses in a noise environment exceeding 60 dBA L_{dn} , which exceeds the noise and land use compatibility standards presented in the City of Sunnyvale's General Plan. Interior noise levels would be expected to exceed 45 dBA without the incorporation of noise insulation features in the project design. **This is a *potentially significant impact*.**

The project proposes the construction of a 250-unit townhouse development adjacent to Duane Avenue. The site would be bordered by residential land uses to the north, and offices and parking lots to the east, south, and west. The future noise environment at the project site would result primarily from local vehicular traffic along Duane Avenue and distant traffic noise generated by Lawrence Expressway and Highway 101. Exterior use areas proposed by the project include private porches and a small playground. Porches of residential units adjacent to Duane Avenue are oriented toward the roadway.

Future traffic noise levels at the nearest residential units to Duane Avenue, approximately 50 feet from the center of the roadway, would reach 71 dBA L_{dn} . Exterior noise levels at the facades of second-row residential units would be approximately 62 to 67 dBA L_{dn} assuming partial shielding provided by first row units. Exterior noise levels would be 60 dBA L_{dn} or less throughout the remainder of the site. Action Statement 3.6A.1f of the Noise Sub-Element states that the 60 dBA L_{dn} should be applied to common recreation areas, backyards, patios, and medium and large balconies. The exterior noise standard of 60 dBA L_{dn} would not normally be applied to the small private porches or decks associated with residential units proposed by the project. Normally, it is undesirable to design mitigation to reduce exterior noise levels at these spaces given the infeasibility of the mitigation, aesthetics, and the intermittent use of these outdoor areas by residents. As such, no mitigation is recommended to reduce exterior noise levels at the small decks and patios at the project site.

Exterior noise levels at the facades of residential units nearest Duane Avenue would be approximately 71 dBA L_{dn} . Multi-family residential land uses proposed in noise environments greater than 60 dBA L_{dn} are subject to the requirements of Appendix Chapter 1208A.8.4 of the California Building Code. Where exterior noise levels exceed 60 dBA L_{dn} /CNEL, a report must be submitted with the building plans describing the noise control measures that have been incorporated into the design of the project to meet the noise limit.

Standard residential construction with the windows partially open for ventilation provides approximately 15 dBA of exterior to interior noise reduction. Standard residential construction assuming the incorporation of a forced-air mechanical ventilation unit (allowing the occupant to control noise by maintaining the windows shut) provides 20 to 25 dBA of noise reduction in interior spaces. When the required noise reduction of the partition (wall, windows, doors) is greater than 20 to 25 dBA (e.g., in noise environments greater than 65 dBA L_{dn}) sound-rated construction is normally required. Exterior noise exposures at residential facades adjacent to Duane Avenue would require sound-rated construction methods to adequately reduce noise levels in interior spaces. Preliminary estimates indicate that windows and doors with Sound Transmission Class (STC) ratings of 30 STC or greater would be sufficient to reduce interior noise levels to 45 dBA L_{dn} with an adequate margin of safety. Standard construction methods and the incorporation of a forced-air mechanical ventilation system, satisfactory to local building official, would reduce interior noise levels at residential units within interior portions of the site to 45 dBA L_{dn} .

Mitigation Measures:

The following mitigation measures shall be included in the project to reduce the impact to a less-than-significant level:

- Project-specific acoustical analyses are mandated by the State for new multi-family uses where noise levels exceed 60 dBA L_{dn} . The analyses shall meet the following noise reduction requirements. Interior average noise levels shall be reduced to 45 dBA L_{dn} or lower to meet State and local standards. Building sound insulation requirements would need to include the provision of forced-air mechanical ventilation for all new units exposed to exterior noise levels greater than 60 dBA L_{dn} , so that windows could be kept closed at the occupant's discretion to control noise. Special building construction techniques (e.g., sound-rated windows and building facade treatments) would be required for new residential uses adjacent to perimeter roadways. These treatments include, but are not limited to, sound rated windows and doors, sound rated wall constructions, acoustical caulking, etc. The specific determination of what treatments are necessary will be conducted on a unit-by-unit basis. Results of the analysis, including the description of the necessary noise control treatments, will be submitted to the City along with the building plans and approved prior to issuance of a building permit. Feasible construction techniques such as these would adequately reduce interior noise levels to 45 dBA L_{dn} or lower.

With the implementation of the above measures, the impact would be less-than-significant.

Impact 6: Project Operations. Project generated traffic would not measurably change the existing noise environment at nearby noise sensitive uses. **This is a *less-than-significant* impact.**

As stated previously in the discussion of program level traffic noise impacts resulting from the project, the development of the AMD Property with residential land uses would not result in increases in day-night average noise levels at noise-sensitive receivers in the project vicinity. This project's contribution to the future noise environment off-site would not be measurable or perceptible.

Mitigation Measures: None Required

Impact 7: Construction Noise. Noise levels generated by construction activities on the site would not be expected to adversely affect adjacent noise-sensitive land uses along Duane Avenue provided standard construction noise restrictions are implemented at the site and the duration of project construction is limited to one construction season or less. **This is a *less-than-significant* impact.**

Future construction on the site would generate noise, and would temporarily increase noise levels at adjacent land uses. However, residential projects do not normally generate significant noise impacts when standard construction noise control measures are enforced at the project site and when the duration of the noise generating construction period is limited to one construction season (typically one year) or less. With the incorporation of standards measures presented in the program level analysis of construction noise, the noise impact resulting from project construction would be considered less-than-significant.

Mitigation Measures: No additional measures are required.

Impact 8: Noise and Land Use Compatibility (Aircraft). Residential uses developed at the AMD Property would be located in a compatible noise environment in the vicinity of the Mineta San Jose International Airport and Moffett Field. **This is a *less-than-significant impact*.**

See discussion of Impact 4 in the Program Level Analysis.

Mitigation Measures: No additional measures are required.

PROJECT LEVEL ANALYSIS – TAYLOR WOODROW PROPERTY

Impact 9: Noise and Land Use Compatibility. The project proposes residential land uses in a noise environment exceeding 60 dBA L_{dn} , which exceeds the noise and land use compatibility standards presented in the City of Sunnyvale's General Plan. Interior noise levels would be expected to exceed 45 dBA without the incorporation of noise insulation features in the project design. **This is a *potentially significant impact*.**

The Taylor Woodrow project proposes the construction of 304 multi-family residential units. Units would be developed in a mix of condominiums/flats and townhouses. The site is bordered by Duane Court and single-family residential land uses to the north, Lawrence Expressway to the east, a service station to the south, and East Julian Avenue and industrial uses to the west. The future noise environment at the project site would result primarily from local vehicular traffic along Lawrence Expressway. Exterior use areas proposed by the project include common courtyards within the 5-story condominiums/flat buildings at the southeast corner of the project site and small decks and patios at the proposed 5-plex townhouse buildings.

Future noise levels at the project site would range from about 60 dBA L_{dn} at the westernmost portion of the project site (assuming partial shielding by proposed residential buildings) to 73 dBA L_{dn} at unshielded residential facades adjacent to Lawrence Expressway. Noise levels in common courtyards within the 5-story condominiums/flat buildings would be 60 dBA L_{dn} or less assuming the shielding provided by the buildings themselves. Action Statement 3.6A.1f of the Noise Sub-Element states that the 60 dBA L_{dn} should be applied to common recreation areas, backyards, patios, and medium and large balconies. The exterior noise standard of 60 dBA L_{dn} would not normally be applied to the small private porches or decks associated with residential units proposed by the project. Normally, it is undesirable to design mitigation to reduce exterior noise levels at these spaces given the infeasibility of the mitigation, aesthetics, and the intermittent use of these outdoor areas by residents. As such, no mitigation is recommended to reduce exterior noise levels at the small decks and patios at the project site.

Exterior noise levels at the facades of residential units nearest Lawrence Expressway would be approximately 73 dBA L_{dn} . Multi-family residential land uses proposed in noise environments greater than 60 dBA L_{dn} are subject to the requirements of Appendix Chapter 1208A.8.4 of the California Building Code. Where exterior noise levels exceed 60 dBA L_{dn} /CNEL, a report must be submitted with the building plans describing the noise control measures that have been incorporated into the design of the project to meet the noise limit.

Standard residential construction with the windows partially open for ventilation provides approximately 15 dBA of exterior to interior noise reduction. Standard residential construction assuming the incorporation of a forced-air mechanical ventilation unit (allowing the occupant to control noise by maintaining the windows shut) provides 20 to 25 dBA of noise reduction in interior spaces. When the

required noise reduction of the partition (wall, windows, doors) is greater than 20 to 25 dBA (e.g., in noise environments greater than 65 dBA L_{dn}) sound-rated construction is normally required. To control interior maximum noise levels to minimize the potential for activity interference and sleep disturbance, noise insulation features such as stucco-sided walls and sound-rated windows and doors would be required for residences located near Lawrence Expressway. Preliminary estimates indicate that windows and doors with Sound Transmission Class (STC) ratings between 30 and 33 STC would be sufficient to reduce interior noise levels to 45 dBA L_{dn} within units adjacent to Lawrence Expressway with an adequate margin of safety. Standard construction methods and the incorporation of a forced-air mechanical ventilation system, satisfactory to local building official, would reduce interior noise levels at residential units at the westernmost and interior portions of the site to 45 dBA L_{dn} .

Mitigation Measures:

The following mitigation measures shall be included in the project to reduce the impact to a less-than-significant level:

- Project-specific acoustical analyses are mandated by the State for new multi-family uses where noise levels exceed 60 dBA L_{dn} . The analyses shall meet the following noise reduction requirements. Interior average noise levels shall be reduced to 45 dBA L_{dn} or lower to meet State and local standards. Building sound insulation requirements would need to include the provision of forced-air mechanical ventilation for all new units exposed to exterior noise levels greater than 60 dBA L_{dn} , so that windows could be kept closed at the occupant's discretion to control noise. Special building construction techniques (e.g., sound-rated windows and building facade treatments) would be required for new residential uses adjacent to Lawrence Expressway. These treatments include, but are not limited to, sound rated windows and doors, sound rated wall constructions, acoustical caulking, etc. The specific determination of what treatments are necessary will be conducted on a unit-by-unit basis. Results of the analysis, including the description of the necessary noise control treatments, will be submitted to the City along with the building plans and approved prior to issuance of a building permit. Feasible construction techniques such as these would adequately reduce interior noise levels to 45 dBA L_{dn} or lower.

With the implementation of the above measures, the impact would be less-than-significant.

Impact 10: Project Operations. Project generated traffic would not measurably change the existing noise environment at nearby noise sensitive uses. **This is a *less-than-significant* impact.**

See discussion of Impact 6.

Mitigation Measures: None Required

Impact 11: Construction Noise. Noise levels generated by construction activities on the site would not be expected to adversely affect adjacent noise-sensitive land uses along Duane Court provided standard construction noise restrictions are implemented at the site and the duration of project construction is limited to one construction season or less. **This is a *less-than-significant* impact.**

See discussion of Impact 7.

Mitigation Measures: No additional measures are required.

Impact 12: Noise and Land Use Compatibility (Aircraft). Residential uses developed at the Taylor Woodrow Property would be located in a compatible noise environment in the vicinity of the Mineta San Jose International Airport and Moffett Field. **This is a *less-than-significant impact*.**

See discussion of Impact 4.

Mitigation Measures: No additional measures are required.